

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

Roitman, et al.) Group Art Unit: 2879
Serial No.: 09/197,012) Examiner: Gubarey, K.
Filed: November 20, 1998) Docket No. 10981133-1
For: STRUCTURE TO IMPROVE THE)
RELIABILITY OF ORGANIC AND)
POLYMER LIGHT EMITTING)
DEVICES AND METHOD FOR)
PRODUCING SAME)

SEVENTH RESPONSE

Via Facsimile Transmission
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P.O. Box 1450
Alexandria, VA 22313-1450

NEEDLE & ROSENBERG, P.C.
Customer No. 23859

August 29, 2003

Sir:

In response to the outstanding final Office Action mailed by the U.S. Patent and Trademark Office on July 03, 2003 (Paper No. 22), Applicants submit the following remarks.

It is not believed that extensions of time or fees for net addition of claims are required beyond those, which may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 C.F.R. § 1.136(a), and any fees required therefor (including fees for net addition of claims) are hereby authorized to be charged to Agilent Technologies' Deposit Account No. 50-1078.

I hereby certify that this correspondence is being facsimile transmitted to the Amendment Division of the United States Patent and Trademark Office, at facsimile no. 703 308-7382 on day 29 of August, 2003.

Date: 8/29/03 
Leslie Jones

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An advantage of the invention is that it provides light output using a low voltage power supply.

Another advantage of the invention is that the light emitting device operates at high power efficiency.

5 Another advantage of the invention is that it lends itself to generally available simple fabrication techniques.

Another advantage of the invention is that it is simple in design and easily implemented on a mass scale for commercial production.

Other features and advantages of the invention will become apparent to one with skill in the
10 art upon examination of the following drawings and detailed description. These additional features
and advantages are intended to be included herein within the scope of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention, as defined in the claims, can be better understood with reference to
15 the following drawings. The components within the drawings are not necessarily to scale relative
to each other, emphasis instead being placed upon clearly illustrating the principles of the present
invention.

Fig. 1 is a cross-sectional view of a prior art organic light emitting device;

Fig. 2 is a cross-sectional view of an organic light emitting device constructed in
20 accordance with the present invention;

Fig. 3 is a cross-sectional view of a first alternative embodiment of the organic light
emitting device of Fig. 2;

Fig. 4A is a cross-sectional view of a second alternative embodiment of the organic light
emitting device of Fig. 2;

25 Fig. 4B is a perspective view of the second alternative embodiment of the organic light
emitting device of Fig. 4A;

Figs. 5A and 5B collectively illustrate the functionality of the current self-limiting
structure of Figs. 2, 3, 4A and 4B;

Fig. 5C is a cross-sectional view illustrating an alternative embodiment of the cathode of the
30 device of Fig. 5A;

Fig. 6A is a plan view of a variation to the organic light emitting device of Figs. 5A and 5B having the current self-limiting structure applied in conjunction with a cathode;

Fig. 6B is a cross-sectional view illustrating the device of Fig. 6A;

Fig. 7A is a detail view of the current self-limiting structure of Fig. 6B;

5 Fig. 7B is a schematic view of an alternative configuration of the current self-limiting structure of Fig. 7A;

Fig. 7C is a schematic view of another alternative configuration of the current self-limiting structure of Fig. 7A;

10 Fig. 7D is a schematic view of yet another alternative configuration of the current self-limiting structure of Fig. 7A;

Fig. 7E is a schematic view of still another alternative configuration of the current self-limiting structure of Fig. 7A;

Fig. 8A is a plan view of a variation to the organic light emitting device of Fig. 6A having the current self-limiting structure applied in conjunction with an anode; and

15 Fig. 8B is a cross-sectional view illustrating the device of Fig. 8A.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention is typically implemented using a process by which the materials comprising the device are vapor deposited as amorphous films, or cast from solutions.

20 Furthermore, while described in the context of an organic light emitting device, the present invention is applicable to other light emitting structures, for example but not limited to, other light emitting and electroluminescent devices.

Turning now to Fig. 2, shown is a cross-sectional view of an organic light emitting device assembly 100 constructed in accordance with the present invention. In this preferred embodiment, for convention, the organic light emitting device provides light output in the upward direction; however, device 100 can also emit light in the downward direction.

Essentially, the present invention is the introduction of a current self-limiting structure (or structures) within an organic light emitting device. A current self-limiting structure is made from a conducting material of variable resistance. The material is a relatively good conductor under moderate current flow, but becomes highly resistive, or non-conducting, under high current flow. In the absence of such a layer, current rushes towards an area of low